

(No Model.)

F. B. WOOD.  
MULTIPLE CALL BOX.

No. 446,199.

Patented Feb. 10, 1891.

*Fig. 1.*

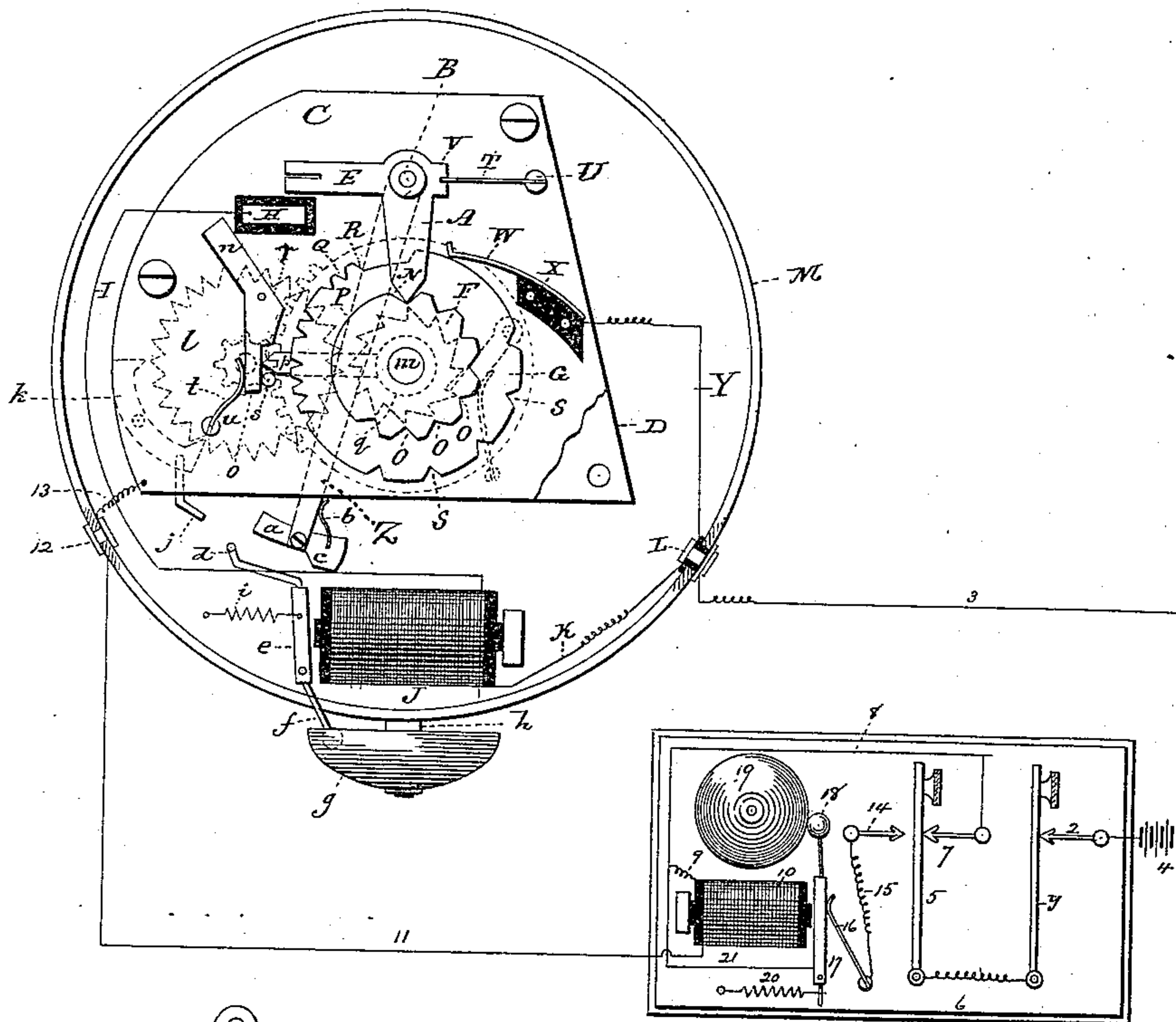
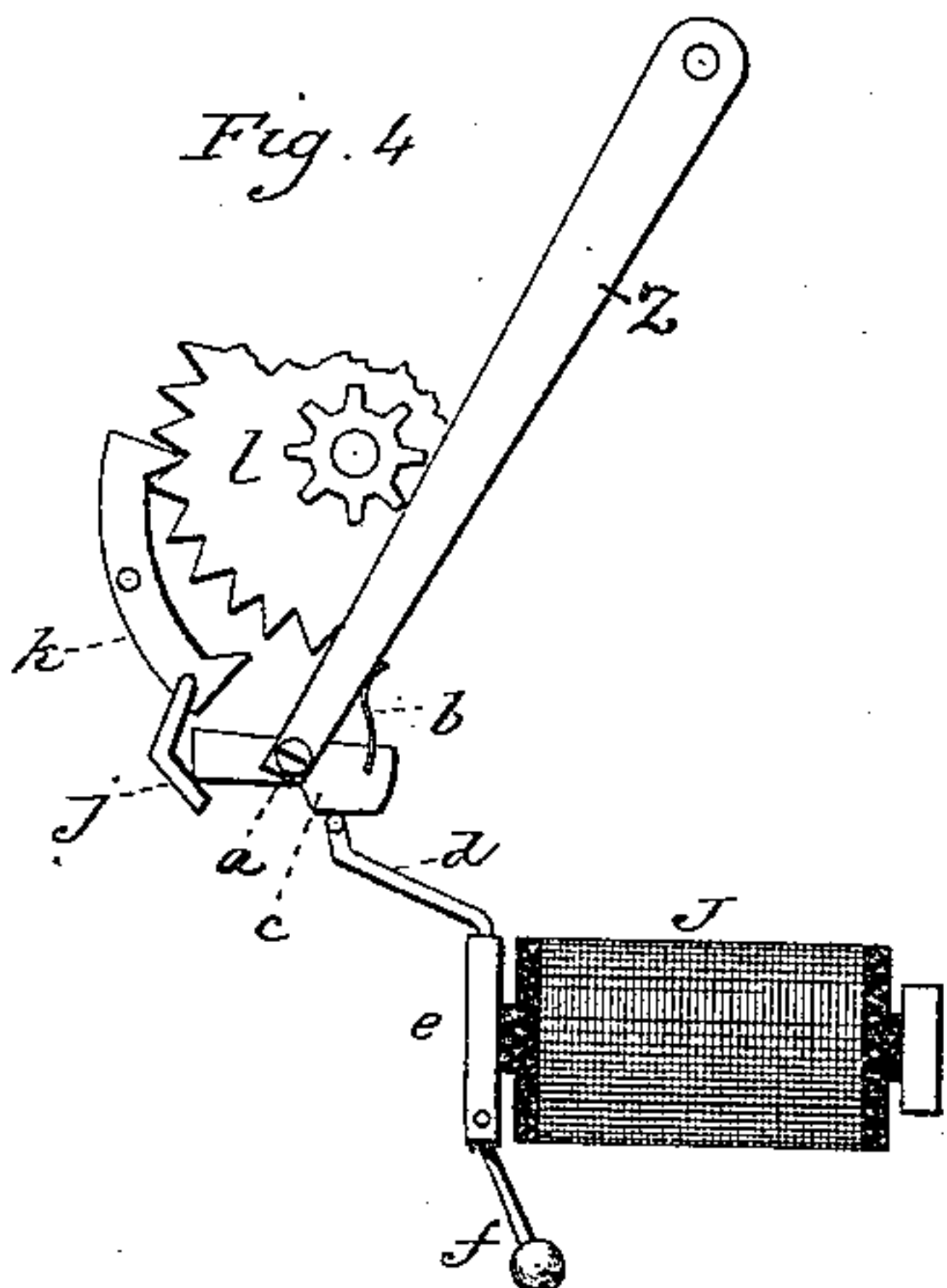
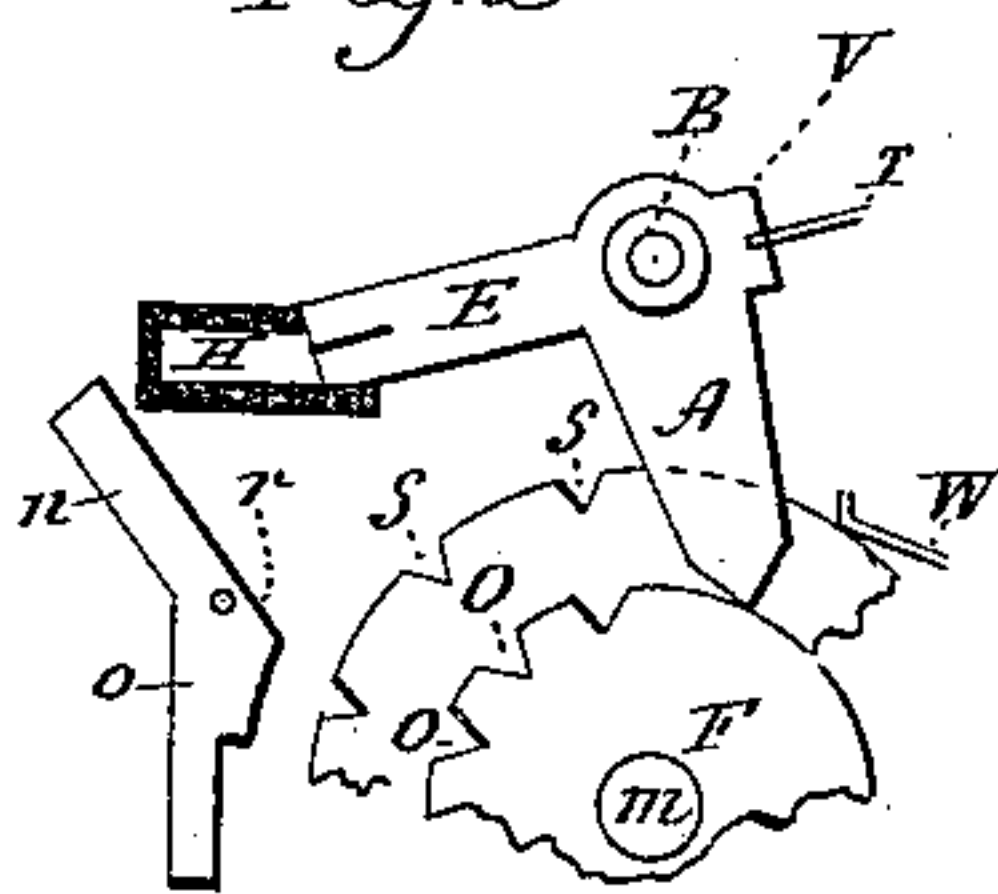


Fig. 4



*Fig. 2*



*Fig. 3*

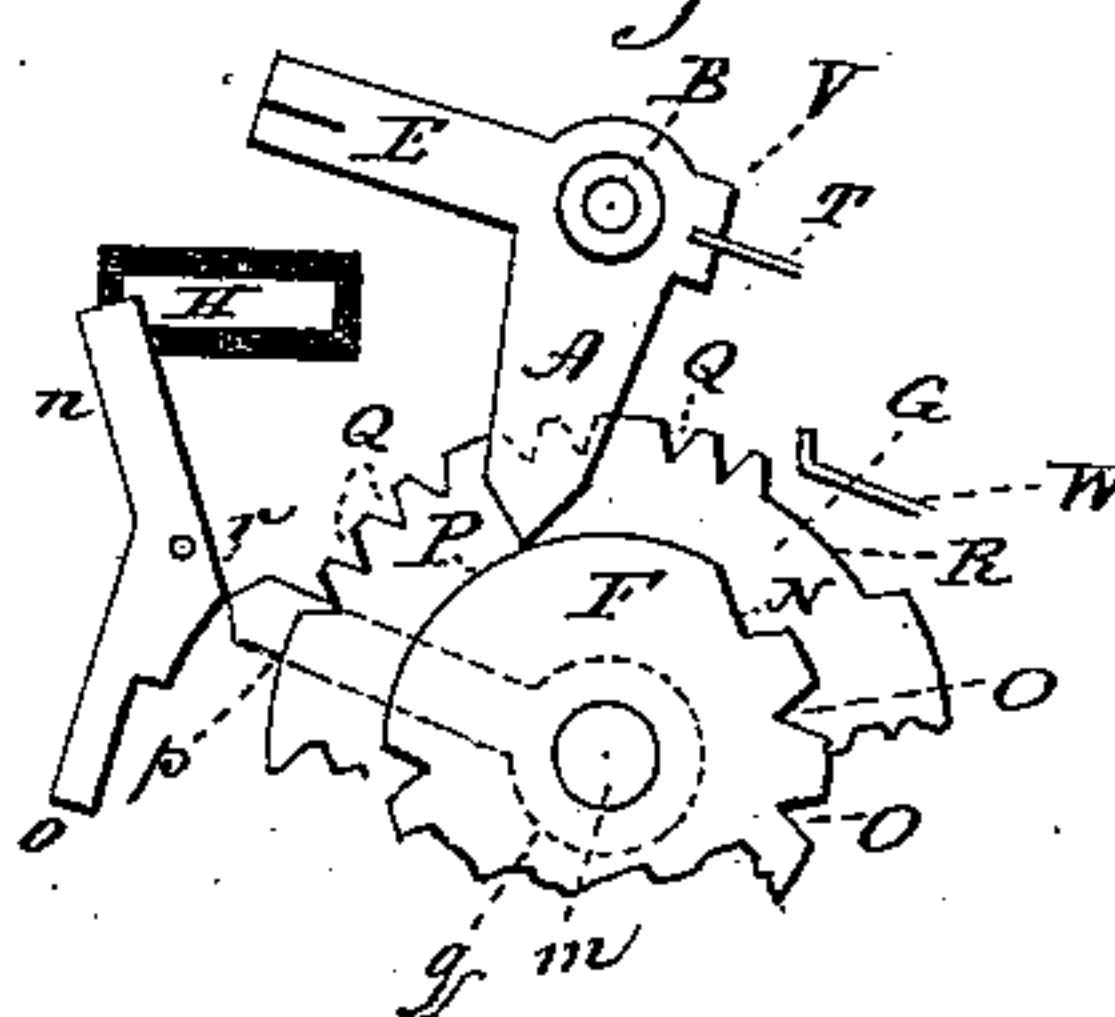
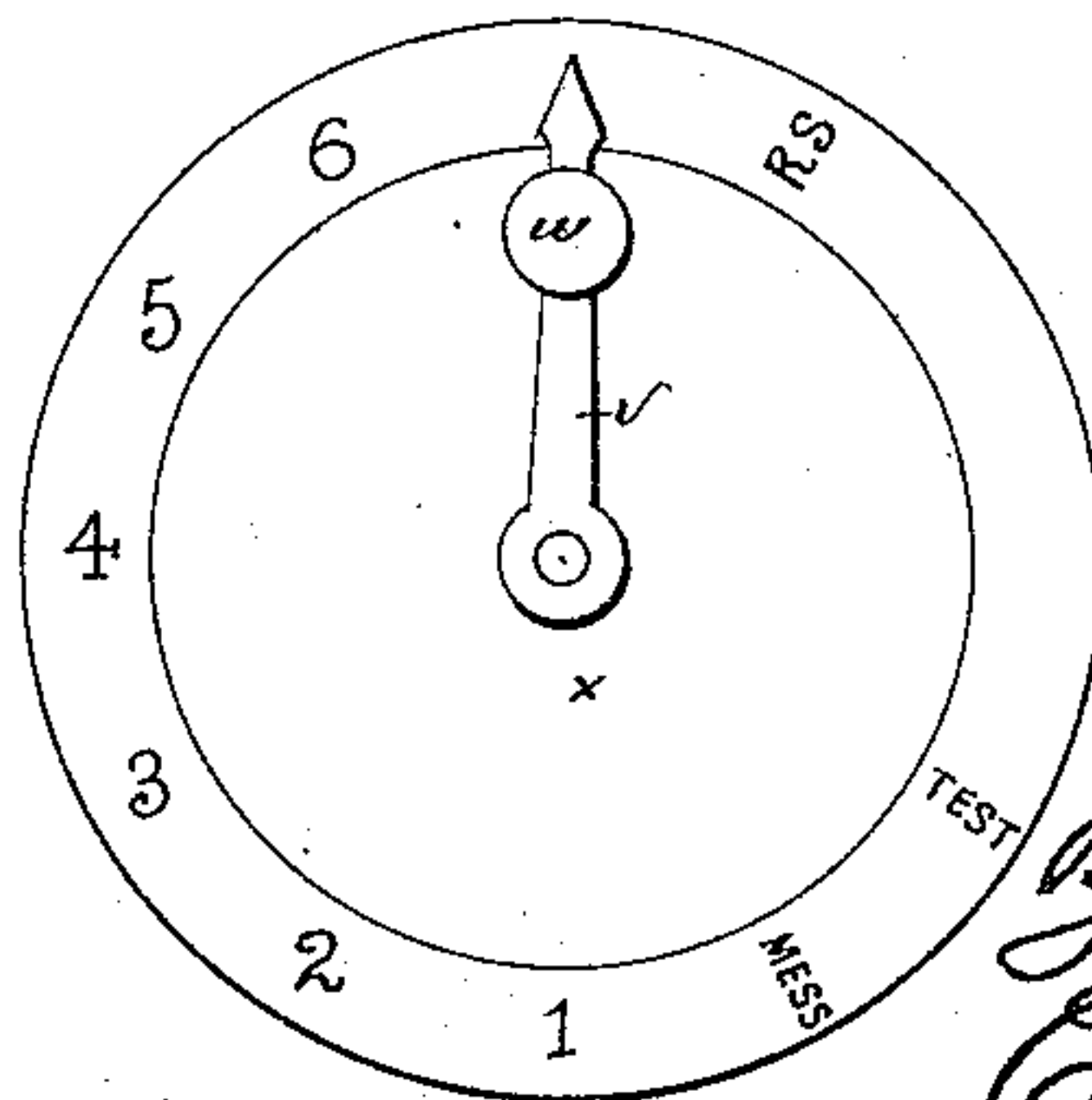


Fig. 5



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## MULTIPLE CALL-BOX.

SPECIFICATION forming part of Letters Patent No. 446,199, dated February 10, 1891.

Application filed January 6, 1890. Serial No. 336,084. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK B. WOOD, of New York, in the county of New York and State of New York, have invented a new Improvement in Multiple Call-Boxes; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a front view of my improved multiple call-box with the dial and crank removed, and showing also one form of central-station apparatus for use with it. Fig. 2 is a detached view showing the positions of the switch-finger and the switch when the crank is pulled down preparatory to making a call. Fig. 3 is a similar view showing the positions of the parts on the reverse movement of the signal-wheel. Fig. 4 is a detached view of the mechanism for locking the train of the box in adjustment for performing that duty. Fig. 5 is a view in front elevation, on a reduced scale, of the dial and crank of the box.

My invention relates to an improvement in multiple call-boxes, the object being to produce an instrument adapted to send in only complete or entire calls, and to give, when it is operated, and without disturbing the central-station apparatus, an audible test-signal for informing the person operating it that there is a circuit over the line, and having a double adaptation to receive return-signals from the central station.

With these ends in view my invention consists in certain details of construction and combinations of parts, as will be hereinafter described, and pointed out in the claims.

As herein shown, the device is provided with an oscillating switch-finger A, secured to the projecting outer end of an arbor B, journaled in the frame-plates C and D of the instrument. A switch E, also secured to the said projecting end of the arbor B, formed from a thin piece of flat sheet metal, is arranged to stand at a right angle to the said switch-finger A, with which it operates. The free and lower end of the said finger, which normally occupies an upright position, is

pointed for engagement with the periphery of the switching-hub F, located upon the outer face of and rotating with a signal-wheel G, while the outer and free end of the switch B, which normally stands in a horizontal position, is arranged for engagement with a switch-block H, connected by a wire I with the box-magnet J, which is itself connected by a wire K to a binding-post L, insulated in the case M of the instrument. The periphery of the said switching-hub F is provided with an open restoring-notch N, into which the pointed end of the switch-finger is normally entered, and with a series of switching-notches O, the remaining portion P of its periphery being left plain or unnotched, for a purpose to be set forth later on. The said restoring-notch is made more open than the switching-notches, so as to permit the switch-finger to enter it at the end of a revolution of the wheel without carrying the same on beyond a full revolution, as would be necessary if the said notch were not made more open or wider at its outer end than the other notches.

The periphery of the signal-wheel G is provided with a series of number-notches Q, which will vary in number and arrangement in each box, with a long return-signal notch R, located at the rear end of the number-notches, and with a series of signal-notches S, which correspond to the switching-notches O in the switching-hub. The said notches upon the peripheries of the switching-hub and the signal-wheel are arranged so that when the wheel is in its normal position the switch-finger will enter the open restoring-notch N in the switching-hub, which notch stands just in advance of the outer end of the long return-signal notch in the periphery of the signal-wheel, so that the plane surface P of the switching-hub stands against the number-notches of the signal-wheel, and so that the switching-notches O in the hub stand against the signal-notches R in the signal-wheel.

A thin flat spring T, mounted in a post U, projecting forward from the front frame-plate C of the instrument, enters a lug V, formed in the upper end of the switch-finger, and exerts a constant tendency to throw the pointed lower end thereof into the notches in



the switching-hub and to disengage the outer end of the switch from the switch-block II. A spring-finger W, forming a circuit-breaker and arranged for contact with the periphery of the signal-wheel, is insulated from the instrument by a block X, secured to the front frame-plate C thereof and connected by a wire Y with the insulated binding-post L, before mentioned.

A long stop-lever Z, secured at its upper end to the oscillating arbor B, is provided at its lower end with a transverse pivotal shoe *a*, held in its normal position, in which it forms a right angle with the stop-arm, by a small spring *b*, the said arm Z being arranged upon the arbor B, so that when the switch-finger A is entered into the open switch-restoring notch N in the periphery of the switching-hub F the arm will stand in the inclined position in which it is shown in Fig. 1 of the drawings. The lower face of the inner end of the shoe *a* is extended and provided with a bevel *c* for engagement with a bent locking-finger *d*, attached to the upper end of the armature *e* of the box-magnet J, the said armature being pivoted at its lower end and provided with a bell-hammer *f*, arranged to strike a bell *g*, mounted upon a stud *h*, secured to the case M of the instrument.

A small spring *i*, attached to the armature *e*, is provided for holding the same normally away from the poles of the magnet J. The outer end of the pivotal shoe *a* is adapted for engagement with the bent lower end of a locking-finger *j*, depending from the lower end of the pallet *k*, working in the teeth of the escapement-wheel *l* of the box-train which includes the main arbor *m*, to which the signal-wheel G, and consequently the switching-hub F, is rigidly attached. This train may be arranged in any approved way, and, corresponding, as it does, to the ordinary train of a call-box, need not be set forth in detail.

A secondary switch is pivoted to the front frame-plate C of the instrument in position for the engagement of its upwardly-extending arm *n* with the switch-block H, before mentioned, and for the engagement of its downwardly-extending arm *o* by the beveled outer end of a stop-arm *p*, extending radially outward from the hub *q* of the signal-wheel, and arranged with respect to the notches in the periphery thereof so that as soon as in the signaling rotation of the said wheel the inner end of the return-signal notch R has been brought under the spring-finger W and the circuit broken in the instrument the arm will engage with the beveled surface *r* of the secondary switch and turn the same so as to carry its upper end *n* into engagement with the switch-block H, after which the arm moves on into engagement with the stop-pin *s*, mounted in the front frame-plate C of the instrument. A light spring *t*, mounted in a split stud *u*, secured to the said frame-plate, is engaged with the lower end *o* of the sec-

ondary switch and exerts a constant effort to disengage the upper end thereof from the switch-block H and to throw its lower end *o* into position for engagement by the beveled end of the stop-arm *p*.

The outer end of the main arbor *m* is provided with a combined crank and indicator *v*, provided with a handle *w* and standing in front of a dial *x*, forming a part of the instrument, and shown in reduced size in Fig. 5 of the drawings, and provided upon its face with lettering and characters corresponding in arrangement to the arrangement of the signal-notches upon the signal-wheel and the switching-hub.

The central-station apparatus shown in connection with Fig. 1 of the drawings is provided with a single-point key *y*, normally engaged with a contact-point 2, connected by the line-wire 3 with the insulated binding-post L of the box, the said wire 3 including the battery 4. The central-station apparatus is also provided with a double-point key 5, connected by a coiled wire 6 to the key *y* and normally engaged with a contact-point 7, connected by a wire 8 and a short wire 9 with the single-stroke end of the central-station magnet 10, which is connected by a return-wire 11 of the main line with a binding-post 12, mounted in the case M of the box and connected by a small wire 13 with the front frame-plate C of the instrument. The other contact-point 14 of the said double-point key 5, which is normally disengaged from it, is connected by a coiled wire 15 with a spring 16, in contact with the armature 17 of the said central-station magnet 10; the upper end of the said armature being provided with a bell-hammer 18, arranged to strike a bell 19, while its lower end is provided with a spring 20 and connected by a wire 21 with the wire 9, before mentioned, leading into the single-stroke end of the said magnet 10.

Having now described in detail the construction of my improved multiple call-box and of a central-station apparatus for use in conjunction with it, I will proceed to set forth the mode of its operation and to explain the paths of the circuits in the several phases thereof.

In the normal condition of the box its combined crank and indicator stands in the position in which it is shown by Fig. 5 of the drawings. The switch-finger A is entered into the switch-restoring notch N of the switching-hub F, the switch E is disengaged from the block H, the spring-finger W is engaged with the periphery of the signal-wheel G at a point adjacent to the outer end of the long return-signal notch R, and the secondary switch is retired, as shown by Fig. 1 of the drawings. Under these conditions the circuit is closed in the box and through the single-point key of the station apparatus. When now it is desired to send a signal, the handle *w* of the crank *v* is grasped and the crank carried around to the word "Test" upon



the dial of the box, whereby the signal-wheel and the switching-hub are rotated with the arbor *m*, and the spring attached thereto is wound. The described movement of the switching-hub operates to throw the switch-finger A and the switch E into the positions in which they are shown by Fig. 2 of the drawings, whereby the switch is engaged with the switch-block H, and the box-magnet J is additionally cut into the circuit through the wire I, connecting the switch-block H with the said magnet. The described rotation of the arbor also carries all of the number-notches Q in the signal-wheel beyond the spring-finger W, so that when the crank *v* is released and the arbor and wheel reversely rotated under the action of the mainspring the number-notches will be passed in the reverse direction under the spring-finger W. Now in the forward and reverse rotation of the signal-wheel, during which the switch A is held in engagement with the switch-block H by the surface P of the switching-hub F, the circuit will be alternately through the finger W when in contact with the wheel and through the magnet J when the number-notches Q in the wheel pass under the said finger, so that the circuit is never broken, but intermittently shunted through the magnet, which, when so energized, affects the ringing of the box-bell and informs the person testing the box that there is a circuit over the line leading to the central station. If the bell does not ring, the person testing the box knows that there is no circuit over the line, and the signal-wheel is stopped in its reverse rotation by the engagement of the stop-arm *p* with the stop-pin *s*. Just before the said arm is engaged with the said pin the former operates the secondary switch and throws the arm *n* thereof onto the switch-block; but this movement of the secondary switch has no significance in this phase of the operation of the box. The word "Test" is placed upon the dial to guide the person testing the line in turning the crank only enough to secure the test and not far enough to send a call into the central station in case the line is in working order. To send in a simple call to the central station by means of the box, the crank is turned to the word "Messenger," which occupies the next point on the dial beyond the word "Test," before referred to. If now during the forward movement of the crank the bell in the box does not ring, the person calling need not wait for a return-signal from the central station, as he will know from the failure of the bell to ring that there is no circuit over the line; but if the bell does ring when he begins to turn the crank he will keep on and turn it until he has brought it opposite the word "Messenger," the bell ringing all the time. Meanwhile this movement of the crank carries the blank surface P of the switching-hub F beyond the range of the switch-finger A and brings the first of the switching-notches in the switching-hub under the said finger, so that when

the crank is released the finger will be shunted to the left and the switch disengaged from the switch-block H, as shown by Fig. 3 of the drawings, whereby the magnet J is switched out of the circuit. In the reverse movement of the signal-wheel that now results the number-notches therein will be passed under the spring-finger W and the circuit over the main line interrupted. Beginning with the spring-finger W, the circuit will now be through the same, the wire Y, the binding-post L, the wire 3, the battery 4, the contact-point 2, the single-point key *y*, the coiled wire 6, the double-point key 5, the contact-point 7, wire 8, the wire 9, the magnet 10, the wire 11, the binding-post 12, the wire 13, the front frame-plate C of the instrument, and thence through the instrument to the signal-wheel. The interruptions of this circuit as the number-notches are carried under the spring-finger W will cause the magnet at the central station to be energized in ringing the bell 19 thereat in exact accordance with the number and arrangement of the number-notches in the signal-wheel, so that the number which the wheel represents will be audibly reproduced at the central station. Just so soon as the number-notches in the signal-wheel have passed the spring-finger W the same drops into the long return-signal notches R therein and breaks the line-circuit, which, however, is immediately closed through the magnet J by the secondary switch *n*, which is operated there by means of a stop-arm *p*, which here has the switching function. When the magnet J is energized, it attracts its armature *i* to it, and thus lifts the stop-finger *d*, carried by the upper end of the armature, with the effect of lifting the inner end of the pivotal shoe *a*, mounted in the lower end of the stop-lever Z, which was thrown over into the position in which it is shown by Fig. 4 of the drawings at the same time that the finger A and the switch E were thrown to the left, as shown by Fig. 3 of the drawings. The elevation of the inner end of the pivotal shoe causes the depression of the outer end thereof against the bent lower end of the stop-finger *j*, depending from the pallet *k*, which is thus locked into the escapement-wheel, whereby the train of the call-box is stopped and locked with the cranks standing against the letters "R S," located one point on the dial to the right of the zero-point thereof. The call-box is now in readiness to receive a return-signal from the central station. If the signal received at the central station is a perfect signal, the operator at that point presses down the double-point key 5 into engagement with the contact-point 14, breaking its engagement with the contact-point 7. Beginning with the contact-point 14, the current will now flow through the said contact-point, the wire 15, the vibrating spring 16, the armature 17, the wire 21, the wire 9, the magnet 10, the wire 11, the binding-post 12, the wire 13, the front frame-plate C, the signal-wheel G, the stop-



arm *p*, the secondary switch, the insulated switch-block *H*, the wire *I*, the magnet *J*, the wire *K*, insulated binding-post *L*, wire 3, battery 4, contact-point 2, the single-point key 5 *y*, the coiled wire 6, and the double-point key 5. The circuit being now through the vibrating-stroke side of the magnet 10, the circuit is rapidly interrupted in that magnet, thereby causing corresponding interruptions 10 in the magnet *J*, which will operate in rapidly vibrating its armature *i*, the stop-finger *d* whereof will actuate the pivotal shoe *a*, in operating the pallet *k*, in intermittently locking and unlocking the train of the box through 15 the escapement-wheel *l* thereof, at the same time ringing the bell *g* of the box with a vibratory stroke, thus giving a definite and distinct signal, denoting the receipt of a perfect call at the central station. This action will 20 continue until the long return-signal notch *R* of the signal-wheel has passed beyond the spring-finger *W*, which so soon as it engages with the wheel again will short-circuit the magnet *J*, which will also be additionally 25 switched out by the operation of the spring *t* upon the lower end of the secondary switch, the arm *p* having passed out of the path of the switch. The operation of the train under the control of the vibrating current causes 30 the crank to move from the return-signal point on the dial to the zero-point thereof, bringing the open restoring-notch of the switching-hub directly under the switch-finger, which is thrown into the said notch 35 by the action of the spring *T*.

In case the signal has not been perfectly received, owing to an imperfect adjustment or otherwise of the receiving apparatus at the central station, the operator at the said 40 station manipulates the single-point key *y* to simply break the line-circuit, thereby demagnetizing the magnet *J*, the armature *i* whereof will fall back and permit the pivotal shoe *a* to release the pallet *k* and permit the train 45 of the box to run until the stop-arm *p* has been brought into engagement with the stop-pin *s*, at which time the crank will have been restored to its zero position and the open restoring-notch been brought under the finger 50 *A*. The failure of the bell to ring when the crank returns from the return-signal point on the dial to the zero-point thereof will now indicate to the person operating the box that, although the circuit is perfect over the line, 55 his call has not been perfectly received at the central station, and notifying him that he must repeat the call.

I have now described the operation and action of the box for sending in a simple call. 60 Its action, however, will be the same for sending in any of the additional calls or signals, which in this instance are shown to be six in number.

It will be seen from the foregoing that the 65 very act of making a call upon my improved call-box secures a notification of the condition of the circuit. If this notification is to

the effect that there is no circuit over the line, the person calling need not wait for a response to his call. This feature of my improved box makes it much more convenient and desirable than any box heretofore constructed, so far as I am aware. The described provision for preventing any but complete 70 calls being sent in by my apparatus also avoids the confusion incident to the sending in of incomplete or partial calls, as may occur with the ordinary call-boxes when not carefully operated. Furthermore, the adaptation of my improved apparatus for securing two 80 readily-distinguishable return-signals at the box facilitates the use of the apparatus and improves the results secured from it. It may be stated here that, if desired, the armature *i* of the magnet *J* may be pivoted so as to sound 85 one single stroke upon the box-bell when the circuit through the magnet *J* is broken, so that when the return-signal for an imperfect call is made by operating the single-point key at the central-station apparatus a single 90 stroke of the bell *g* at the box will be sounded; but the difference between one single stroke upon the bell and a vibrating stroke thereupon is so sharp that the two signals on the bell can never be confounded. 95

It is apparent that in carrying out my invention some changes in the particular construction herein shown and described may be made. I would therefore have it understood that I hold myself at liberty to make such alterations from the construction herein shown as fairly fall within the spirit and scope of my invention. 100

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is— 105

1. In a multiple call-box, the combination, with a signal-wheel, of a circuit-breaker adapted to engage therewith, a magnet, a bell operated thereby, and a switch co-operating with 110 the signal-wheel and arranged in such relation thereto that the rotation of the wheel in preparing to make a call operates the switch to shunt the line-circuit through the magnet and its signaling or opposite rotation 115 to switch the magnet out of line, whereby the bell is sounded in preparing to make a call if there is a circuit over the line, substantially as described.

2. In a multiple call-box, the combination, 120 with a signal-wheel, of a circuit-breaker adapted to engage therewith, a magnet, a bell operated thereby, a notched switching-hub rotating in unison with the wheel, which, with the hub, is rotated in preparing to make a call, 125 an oscillating finger adapted to engage with the said hub, and a switch operated by the said finger and connecting the wheel and magnet electrically, the said finger being arranged in such relation to the hub as to operate the switch in shunting the line-circuit 130 through the magnet in preparing to make a call, substantially as described.

3. In a multiple call-box, the combination,



with a signal-wheel, of a circuit-breaker adapted to be engaged therewith, a magnet, a bell operated thereby, a notched switching-hub rotating in unison with the signal-wheel, a switch-finger adapted to engage with the notches of the said hub, so as to be moved thereby, a switch partaking of the movements of the said finger, a switch-block with which the switch is engaged in one of the shunted positions of the said finger, electrical connection between the said block and the magnet, and means for rotating both the signal-wheel and switching-hub in preparing to make a call, the switch-finger being arranged in such relation to the hub as to operate the switch in shunting the line-circuit through the magnet in preparing to make a call, whereby the line-circuit is not broken when the signal-wheel is being rotated preparatory to making a call, but alternately shunted, substantially as described.

4. In a multiple call-box, the combination, with a signal-wheel, of a circuit-breaker adapted to be engaged therewith, a magnet, a bell operated thereby, a notched switching-hub arranged to rotate in unison with the wheel, a switch-finger adapted to be engaged with the notches of the said hub, a switch partaking of the movements of the said finger, electrical connection between the magnet and the switch, a spring co-operating with the said finger and exerting a constant tendency to engage it with the notches in the hub, and means for rotating the wheel and hub together in preparing to make a call, the finger and hub being relatively arranged so as to shunt the line-circuit through the magnet in the preliminary rotation of the hub and wheel, substantially as described.

5. In a multiple call-box, the combination, with a signal-wheel, of a circuit-breaker adapted to engage therewith, a magnet, a bell operated thereby, a switch co-operating with the wheel and arranged in such relation thereto as to shunt the line-circuit through the wheel in preparing to make a call, a stop-arm rotating with the wheel, a secondary switch brought into action by the said arm for preparing the box to receive a return-signal, and means for rotating the wheel in preparing to make a call, substantially as described.

6. In a multiple call-box, the combination, with a signal-wheel, of a circuit-breaker adapted to be engaged therewith, a magnet, a notched switching-hub rotating in unison with the wheel, a switch-finger adapted to be engaged with the notches of the said hub which shifts it, a switch partaking of the movements of the said finger, a stop-arm rotating in unison with the signal-wheel, a secondary switch operated by the stop arm in preparing the box to receive a return-signal, and connections between the said switches and the magnet, substantially as set forth.

7. In a multiple call-box, the combination, with a signal-wheel, of a circuit-breaker adapted to be engaged therewith, a notched switch-

ing-hub rotating in unison with the said wheel, a switch-finger adapted to be engaged with the notches of the hub which shifts it, a switch partaking of the movements of the said finger, a stop-lever also partaking of the movements of the said finger, a magnet provided with an armature, a train provided with an escapement-pallet, and a locking mechanism parts of which are carried by the said stop-lever, armature, and escapement-pallet and brought into operation for locking the train by the energization of the magnet and the attraction of the armature thereof thereto, substantially as set forth.

8. In a multiple call-box, the combination, with a signal-wheel, of a circuit-breaker adapted to be engaged therewith, a notched switching-hub rotating in unison with the said wheel, a switch-finger adapted to be engaged with the notches of the hub which shifts it, a switch partaking of the movements of the said finger, a stop-lever also partaking of the movements of the said finger, a magnet provided with an armature, a train provided with an escapement-pallet, a pivotal shoe mounted in the lower end of the stop-lever, and two locking-fingers respectively carried by the escapement-pallet and by the magnet-armature, the said shoe and stop-fingers forming a locking mechanism which is brought into action for locking the train when the said magnet is energized, substantially as set forth.

9. In a multiple call-box, the combination, with a signal-wheel, of a circuit-breaker adapted to be engaged therewith, a switching-hub rotating in unison with the wheel and provided with a plane surface and with a series of switching-notches corresponding to the signal-notches in the signal-wheel, the notch at one end of the series of notches in the switching-hub being made more open than the others, a switch-finger adapted to engage with the switching-hub and the notches therein and dropping readily into the said open notch thereof, a switch partaking of the movements of the said finger, and a magnet and connection between the switch and the magnet, the circuit through the line being shunted through the magnet from the circuit-breaker when the signal-wheel is operated preparatory to making a call, substantially as set forth.

10. A multiple call-box having a signal-wheel provided with a long return-signal notch located at one end of its number-notches, a secondary switch brought into action by the box just before the same is stopped, and a locking mechanism for arresting the train of the box, controlled by the said secondary switch, in combination with a central-station apparatus having a magnet, a single-point key for making a prolonged interruption of the current through the magnet, and a double-point key for making an intermittent or vibratory interruption of the current, substantially as set forth.

11. In a multiple call-box, the combination,



with a signal-wheel, of a circuit-breaker adapted to be engaged therewith, a switching-hub having its periphery notched to correspond to the signal-notches in the said wheel, a switch-  
5 finger mounted upon an arbor journaled in the frame-plates of the box and adapted to be engaged with the notches in the said hub, a switch also mounted upon the said arbor, a switch-block located for engagement with the  
10 said switch when the switch-finger is shifted by the hub, a magnet having its armature provided with a stop-finger, connection between the said switch-block and magnet, a stop-lever also secured to the said arbor and  
15 provided at its lower end with a transverse

shoe, a train the escapement-pallet whereof is provided with a stop-finger which co-operates with the said shoe and the stop-finger of the armature in locking the train, a stop-arm rotating in unison with the signal-wheel, and  
20 a secondary switch adapted to engage with the switch-block before mentioned and brought into action by the said stop-arm just before the same acts to stop the wheel, substantially as set forth.

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